State of California • Department of General Services • Gray Davis, Governor
TELECOMMUNICATIONS DIVISION
601 Sequoia Pacific Boulevard • Sacramento, CA 95814-0282 • (916) 657-9903

October 19, 2000

To All California Wireless Carriers -

This Request for Information (RFI) pertains to enhanced wireless 9-1-1 capabilities required by the Federal Communications Commission (FCC) under FCC Order 94-102.

The State of California, Department of General Services, 9-1-1 Program Office is currently planning for the implementation of enhanced wireless 9-1-1 (a.k.a. wireless E9-1-1) throughout California. To help formulate our rollout strategy and budget accordingly we are collecting and evaluating information from wireless carriers. We believe that it is in the best interest of the wireless industry and public safety alike to provide for wireless carrier input early in the planning process. We strongly encourage and very much appreciate you answering as many questions as possible.

In order to determine the feasibility of implementing the FCC Order in various wireless markets throughout California, we need answers to the questions listed in the RFI, Section 2. We understand that some of the information we are requesting may be proprietary in nature. Hence, all information collected will be kept confidential. We are willing to enter into non-disclosure agreements if desired by your company.

If you have any questions related to the content of this RFI, please feel free to contact John Marengo at John.Marengo@dgs.ca.gov, telephone (916) 657-9236 or Denise Clark at Denise.Clark@dgs.ca.gov, telephone (916) 657-9177. Once again, we very much appreciate your participation and look forward to working with each of your respective companies as we jointly strive to improve wireless 9-1-1 service in California.

Sincerely,

Daphne Rhoe

Daphne Rhoe
Program Manager
State 9-1-1 Program Office

I. General Information

1.1 Introduction

This Request for Information (RFI) solicits design and budgetary information from companies capable of providing technical solutions required by Federal Communications Commission (FCC) Order 94-102. The State of California 9-1-1 Program Office expects

that the responses to this RFI will give a clearer picture as to capabilities possible and will help establish minimum requirements not clearly defined by FCC 94-102.

1.2 Definitions

For the sake of clarity and brevity, the following definitions should be referenced whenever the following terms are used throughout this RFI or in responses:

Air Interface – A term referring to the technology or methodology used by a wireless carrier to provide wireless telephone service to their subscribers. Some common air interfaces are TDMA, CDMA, GSM, and AMPs (see definitions that follow).

ALI
Automatic Location Identification – Refers to a 9-1-1 caller's location. In landline E9-1-1 this is an address. In Wireless E9-1-1, ALI refers to either the cell site/sector receiving the call (FCC 94-102, Phase I) or the actual location of the caller within a pre-defined accuracy requirement (FCC 94-102, Phase II). Phase II information will be delivered by wireless carriers using an (X,Y) coordinate.

ALI Database – Refers to the database(s) owned by providers of E9-1-1 service (in California, SBC and Verizon) that are accessed by PSAPs automatically whenever a 9-1-1 call is made from a landline phone.

AMPS:
Advanced Mobile Phone Service – The original analog mobile phone technology. As compared to digital service, AMPS service is much less spectrum efficient and less amenable to enhanced digital-based features.

ANI
Automatic Number Identification – A 9-1-1 caller's callback number. In a wireless 9-1-1 environment ANI includes the full 10-digit telephone number (area code + 7-digits) of the caller, whereas in a landline E9-1-1 environment only 8 digits are commonly delivered. Generally, in a landline environment, the area code is converted to a single digit also referred to as an NPD (number plan digit) and then converted back to an area code at the PSAP.

AOA
Angle of Arrival – A network-based wireless location technology that determines a mobile caller's location by measuring and comparing the angles signals are received at from multiple antennae on a cell site.

Call Set-Up Time – Generally in an E9-1-1 system call set-up is the time interval starting when the caller presses the last dialed digit (the "1" of 9-1-1) until the E9-1-1 controller begins ringing the PSAP work station. In wireless E9-1-1 systems, the call set-up time would commence with the caller depressing the "send" key. Call set-up times may be expressed as a range due to variations in equipment ring cycles, radio signal capture times, and/or other factors.

CAMA

Centralized Automatic Message Accounting – An in-band multi-frequency (MF) signaling protocol used extensively throughout E9-1-1 networks in the United States to deliver the ANI of the 9-1-1 caller from the local central office to the selective router and/or PSAP. The CAMA signaling protocol is limited to 8-digits. A number plan digit (NPD) is used to encode the area code of the caller so that a full 10-digit number can be displayed at the PSAP.

CAS
Call Associated Signaling – A methodology for delivering FCC 94-102, Phase I data elements (both ANI & P-ANI) over the same circuitry as the 9-1-1 caller's voice. Usually, CAS solutions require upgrades to E9-1-1 network (from CAMA signaling protocols) and customer premise equipment (to accommodate the 20 digits needed for the ANI and P-ANI).

CDMA
Code Division Multiple Access – A digital wireless air interface technology that spreads the transmission of all users in parallel across a wide band of frequencies. CDMA is one of newer air interfaces spreading rapidly in the United States and throughout the world.

Cellular Telephone Service – Refers to the wireless phone service being offered by carriers in the 800 - 900 MHz band of spectrum. Cellular service may be analog or digital and may use any air interface.

CLEC
Competitive Local Exchange Carrier – A company registered with the public utilities commission to provide local landline phone service to compete with incumbent providers. In California, CLECs are required to connect to the E9-1-1 network infrastructure (owned by SBC and Verizon) in order to provide E9-1-1 services.

County Coordinator (E9-1-1) – Designated individual in each county responsible for providing emergency service number (ESN) updates to the Incumbent Local Exchange Carrier (ILEC) for E9-1-1 routing and database issues. County coordinators work extensively with PSAPs in their counties and local authorities to ensure integrity of the data submitted to the ILECs for the purpose of E9-1-1.

CPE
Customer Premise Equipment – Refers to telephone equipment at the customer's premise. For the purpose of E9-1-1, CPE refers to special telephone equipment needed to interface with the landline E9-1-1 network in order to display and use the callers ANI, ALI, and other E9-1-1 features, such as selective transfer.

E9-1-1
Enhanced 9-1-1 – A system that routes 9-1-1 calls to the most appropriate answering points based on the originating location (addresses) of the calls and that also provides for the respective callback numbers and locations to be displayed there.

EMF
Enhanced Multi-Frequency – An in-band signaling protocol that allows for the delivery of a full 20-digits (ANI & P-ANI) from the selective router to the PSAP. EMF trunks are typically installed where CAS methodologies are used for wireless E9-1-1.

ESN (E9-1-1)
Emergency Services Number – A 3-digit number identifying a unique combination of police, fire, and medical agencies associated with a particular address. The ESN is used by the ILEC's selective router for routing purposes and generally stored in the ILEC's ALI database for ALI retrieval purposes. This ESN should not to be confused with the "electronic serial number" used by wireless carriers.

ESRD
Emergency Services Routing Digits – A string of digits sometimes referred to as a P-ANI which uniquely identifies a cell site/sector in a CAS implementation of Phase I service. An ESRD can be a 10-digit, 8-digit, or 7-digit non-dialable number, depending on E9-1-1 network capabilities.

ESRK
Emergency Services Routing Key – A string of digits assigned by a wireless carrier to carry all the information needed to satisfy FCC Order 94-102. An ESRK is associated with an NCAS implementation of wireless E9-1-1, which can utilize the capabilities of existing E9-1-1 networks without significant modifications.

ESZ
Emergency Services Zone – An area of a city, town, or county where the emergency service providers (police, fire, and medical) are the same throughout. ESZs are established by ILECs working in conjunction with E9-1-1 county coordinators. ESZs are associated with ESNs for routing purposes.

FCC Order 94-102 – An order released by the Federal Communications Commission (FCC) in 1996, specifying that wireless carriers are required to be able to provide enhanced 9-1-1 services for their wireless subscribers by specified dates. Specifically, Phase I of the Order specified that carriers need to provide the callback number and originating cell site/sector of a wireless 9-1-1 caller by April 1998. Phase II of the Order specified those carriers add the actual location of the caller, within certain accuracy requirements, by October, 2001. Actual implementations of the service are conditioned on PSAP CPE readiness and a formal request being issued by the PSAP authority.

GPS
Global Positioning System – A system that uses various satellites to ascertain the location of a subject with a high degree of accuracy.

GSM
Global Standard Metric – A digital wireless air interface widely used in Europe that is also established in the United States.

Handset-Based Solution - In reference to FCC Order 94-102, Phase II, a handset-based solution refers to the technology or methodology that uses elements installed in the wireless subscriber's phone (in conjunction with various network elements) to deliver the location information required by the Order.

ILEC
Incumbent Local Exchange Carrier – Telephone companies originally authorized by public utility commissions to provide the only local landline phone service in designated service

areas. Since the passage of the Telecommunications Reform Act of 1996, many other phone companies (competitive local exchange carriers) can now also provide local service. In California, SBC and Verizon are the two major ILECs currently providing E9-1-1 network and database services.

MSC
Mobile Switching Center – A wireless central office that controls switching and other functions needed for wireless service. MSCs connect wireless subscribers to the PSTN. In a Wireless E9-1-1 implementation, MSCs would typically connect to the ILEC's selective routers in order to gain access to the landline E9-1-1 network infrastructure.

Multi-Path Fingerprinting – A network-based wireless location technology that determines a mobile caller's location by analyzing radio multi-path patterns.

NCAS
Non-Call Associated Signaling – A methodology of delivering wireless E9-1-1 service over existing E9-1-1 networks without making major modifications to either the network or the CPE. NCAS solutions encode the wireless caller's callback number, location, and routing information into an 8-digit ESRK to be delivered with the call, and use the existing ALI circuits to deliver this information to the PSAP.

Network-Based Solution – In reference to FCC Order 94-102, Phase II, a network-based solution refers to the technology or methodology that uses elements installed in the wireless company's network to deliver the location information required by the Order. A network-based solution does not require any modifications be made to wireless subscriber phones.

P.0X Grade of Service. The probability, expressed as a decimal fraction that a number(X) of calls out of one hundred will receive a busy signal on the first dialing attempt during the busy hour of an average week during the busy month.

P-ANI
Pseudo Automatic Location Identification – A 10-digit non-dialable number used for routing wireless 9-1-1 calls and identifying cell site/sector information in a wireless E9-1-1 implementation. Generally, both ESRDs (in CAS implementations) and ESRKs (in NCAS implementations) are considered to be P-ANIs.

PCS
Personal Communications System – Refers to the digital wireless phone service now being offered by wireless carriers in the 1.9 –2.0 GHz radio spectrum. Many wireless carriers hold both PCS and cellular licenses and may refer to either or both as PCS service.

PDE
Position Determining Element – A term referring to the system element used to identify a wireless 9-1-1 caller's location in a Wireless E9-1-1 system. Typically, a PDE would be used to add Phase II functionality to a Phase I implementation by capturing the coordinates of the caller (within specified FCC accuracy requirements) thereby allowing the location information to be communicated to the PSAP.

PSAP

Public Safety Answering Point - A communications center that answers 9-1-1 calls. PSAPs can be either primary or secondary. Primary PSAPs answer 9-1-1 calls directly from the public. Secondary PSAPs answer 9-1-1 calls via transfer from primary PSAPs.

PSTN
Public Switched Telephone Network – Refers to the networks typically used for the routing of non-emergency call traffic by public telephone companies. By comparison, landline 9-1-1 traffic is generally routed off-net (into the E9-1-1 network) comprised of E9-1-1 selective routers and databases originally designed to serve landline emergency call traffic.

Selective Router – A tandem central office owned by an incumbent local exchange carrier (ILEC) configured with special E9-1-1 software that allows for the routing of 9-1-1 calls on the basis of address. It does this by translating the telephone number of the caller into a three-digit routing code, otherwise known as an ESN. The ESN is associated with the caller's address.

Selective Routing – One of the three fundamental features of E9-1-1 service (along with ANI and ALI), selective routing uses the address information encoded in the ANI of the caller to automatically route the call to the closest appropriate primary PSAP.

Selective Transfer – A feature of E9-1-1 service that offers a one-touch transfer to various police, fire, or medical PSAPs determined by the ALI of the caller.

SS7
Signaling System Seven – An out-of-band digital signaling protocol developed by the telephone industry in order to provide call set-up, ringing, ringback, call billing, and other necessary functions without using voice path circuitry. SS7 is used extensively in both landline and wireless public telephone networks.

State 9-1-1 Program Office – An organization within the State of California, Department of General Services, Telecommunications Division most responsible for 9-1-1 service in California. Program staff are authorized by law to establish performance standards and funding guidelines, and to otherwise administer the emergency telephone number account for all aspects of 9-1-1 service.

TDMA
Time Division Multiple Access – A digital air interface widely used by wireless carriers in the United States and other countries. TDMA divides voice channels digitally into time slots to make efficient use of a limited radio bandwidth.

TDOA
Time Difference of Arrival – A network-based wireless location technology that determines a mobile caller's location by measuring and comparing the differences in a caller's signal arrival times received at various cell sites.

W E9-1-1 (or Wireless E9-1-1)
Wireless Enhanced 9-1-1 – Service that provides the three basic elements of landline E9-1-1 service (ANI, ALI, and Selective Routing) for wireless callers who dial 9-1-1. Commonly, the term "Wireless E9-1-1" is used when referring to FCC Order 94-102, Phase I or Phase

II. California 9-1-1 authorities generally apply the term "Wireless E9-1-1" to mean a full implementation of FCC 94-102, Phases I and II.

WSP
Wireless Service Provider – A company providing radio phone service in either the cellular band or PCS band of spectrum. Also referred to as CMRS (commercial mobile radio service), these carriers are subject to the terms of FCC Order 94-102.

1.3 Responses Not Binding

The responses to this RFI are not binding upon the vendor or the State.

1.4 Confidentiality

All written responses by vendors will be accepted as confidential, and will be controlled by the State 9-1-1 Program Office until wireless E9-1-1 service is implemented, after which time responses will be returned, if requested. Proprietary data, properly identified by the vendor, will be held in strictest confidence.

1.5 RFI Web Access

A copy of the RFI can be found on the Department of General Services, Telecommunications web page. Go to:

www.telecom.ca.gov/index/asp?mp+offices/911network.asp

OR

www.telecom.dgs.ca.gov, then click on "services" and "9-1-1 Program"

1.6 Submissions

Submissions can be made by email or US Mail. All submissions should be sent to:

State of California
Department of General Services
Telecommunications Division
State 9-1-1 Program
601 Sequoia Pacific Blvd.
Sacramento, CA 95814.0282
Attention: John Marengo
Telephone: (916) 657-9236

Emailed responses should be addressed to John.Marengo@dgs.ca.gov

1.7 Response Format and Timeline

Vendors are asked to submit responses to this RFI by either email attachments using the Microsoft Office Suite of software products or in duplicate by US Mail. Alternatively, vendors may submit a 3.5" personal computer diskette using Microsoft Office Suite software. Vendors who have other methods of submitting responses should check first with the contact listed above.

All responses should be submitted to the State by November 27, 2000 in order to be factored into the State planning process.

2. RFI Questions

Please answer the following questions in as much detail as is required to adequately describe your company's current position on matters. If you have any questions regarding the meaning of any question, please call John Marengo from the State of California, 9-1-1 Program Office at (916) 657-9236.

General Information/Questions:

1. Please provide the name, title, phone number, address, and email address, of the person or persons in your company responsible for the implementation of FCC Order 94-102. If more than one person is responsible, please identify who is the general contact, financial contact, technical contact, and so forth.
2. Approximately how many wireless subscribers do you serve in California?
3. Are there areas in the country where have you already implemented Phase I service? If so, please list the counties, states, PSAPs, or other descriptive information. Feel free to provide PSAP customer contact information.
4. Have you participated in any PSAP trials of Phase I or Phase II service? If so, where? Again, please feel free to provide PSAP contact information.
5. What do you believe to be the major issues (if any) to be resolved prior to implementation of Phase I/II service.
6. Please feel free to provide any additional general information you feel might be appropriate and helpful to the State in pursuing wireless E9-1-1 service in California.

Technical Questions:

1. How many wireless central offices (switching centers) do you currently operate to serve California's wireless callers? Please show (on maps) or describe in detail the locations and coverage areas of each wireless central office you currently operate.
2. Approximately how many cell sites do you use within your system for California? How many cell sites are there for each wireless switching center?
3. Identify the air interfaces (AMPs, TDMA, GSM, CDMA, et al) that you currently use or plan to use for each wireless central office serving California.
4. What is your preferred methodology for delivering wireless E9-1-1 service (CAS, NCAS, hybrid, or other)? Please elaborate and provide descriptive drawings, if required. Could you give a presentation, if requested to do so, in California?
5. What are your estimated call set-up times associated with delivering a wireless call in the E9-1-1 network using your preferred methodology? Please refer to the definition of "call set-up times" in Section 1.2.

6. If requested to do so, could you support a non-preferred call delivery methodology (Example: CAS instead of NCAS or NCAS instead of CAS)?
7. What is your preferred wireless phone location technology for Phase II services (handset-based, network-based, hybrid, or other)? Please feel free to share solutions being evaluated and potential issues related to wireless E9-1-1 Phase II implementations. Are you planning to implement network-based solutions, handset-based solutions, or elements of both in California?
8. Do your mobile switching centers (MSCs) support signaling system 7 (SS7) or other out-of-band signaling protocols from your MSCs to the local exchange carrier (LEC) selective routers for the purpose of wireless E9-1-1?
9. Could you support a full statewide rollout of wireless E9-1-1 service in a short time frame? Or would you prefer a staggered approach? If so, what time period seems reasonable?
10. Are there any technical issues related to the routing of non-subscriber 9-1-1 calls, as required by FCC 94-102? If so, what are they?
11. Based on your experience implementing FCC 94-102 in other states (if any), do you anticipate there being any significant technical issues to resolve prior to Phase I implementation in California? Feel free to relate any pertinent experiences.
12. When do you anticipate being ready and able to provide Phase II service?
13. How would you handle the common problem of multiple 9-1-1 calls being made from a busy freeway interchange? What are the limitations in terms of overflow to other cell sites?
14. Are you aware of the issue pertaining to unintentional dialing of 9-1-1? Do you have any suggestions?
15. What level of service (P.0X) is your network designed to support for call throughput? What measurement tools do you use to monitor performance? Feel free to elaborate on network elements and how they relate to wireless E9-1-1 service.
16. What level of reliability do you think the State should require of wireless carriers who connect to the E9-1-1 network? Could you support alternate routing into the Public Switched Telephone Network (PSTN), or otherwise if requested to do so?
17. What measurement tools will be used to monitor performance of E9-1-1? Please provide a brief description of the kind of reports that will be generated.
18. How do you handle outages in your network today? What are your escalation processes? Do you believe these will work for wireless E9-1-1 problem troubleshooting?
19. Do you have any concerns with the State of California imposing minimum requirements for call set-up, network reliability, connectivity, or other issues not specifically addressed by FCC 94-102? If so, what are they?
20. Are you familiar with the existing landline E9-1-1 infrastructure (CAMA trunking, ESNs, etc.) and how wireless carriers could interface and utilize that infrastructure?
21. Have you considered alternatives to using the existing E9-1-1 landline networks owned by local exchange carriers for the delivery of wireless E9-1-1? If so, please describe.

22. Please feel free to provide any additional technical information you feel might be appropriate and helpful to the State of California in pursuing wireless E9-1-1 service.

Financial Questions:

1. Please describe your plans for establishing billings for wireless E9-1-1 reimbursements. Will billing be by PSAP, selective router, subscriber, call, or otherwise? Are you amenable to various reimbursement models?
2. Where you have already implemented Phase I service, did you sign contracts with local authorities defining the terms of the E9-1-1 service? Please elaborate.
3. Do you require a signed contract between your company and the 9-1-1 authority?
4. Do you have a pricing plan for Phase I service? If so, how is it priced and what does it include? Please include details preferably in a network block diagram format.
5. Do you have a pricing plan for Phase II service? If so, how is it priced and what does it include? Please provide details preferably in a network block diagram format.
6. If requested to do so, do you have any interest in participating in a Phase II trial prior to October 2001? Monetary incentives may be offered.
7. Have you partnered with any vendor for Phase I and Phase II service? If so, who?
8. What is included in the service you provide pertaining to the accuracy of wireless call routing and subscriber databases?
9. Do you expect any monetary reimbursements in exchange for Phase I? Phase II? If so, can you quantify this in absolute dollar or percentage terms? Also, please describe sub-system cost elements and which (if any) you expect to be reimbursed for.
10. Please feel free to provide any additional financial information you feel might be appropriate and helpful to the State in pursuing wireless E9-1-1 service in California.

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